

1 PROCEEDINGS

2 (Transcript follows in sequence from Volume 14.)

3 DON WOOD

4 having been called as a witness on behalf of MCI and AT&T, and
5 being duly sworn, continues his testimony as follows:

6 CONTINUED CROSS EXAMINATION

7 BY MR. FUHR:

8 Q The image of a model with 1 million cells is sort
9 of a daunting constant when you think of 300 or 400 different
10 input values. But some of these cells are not simply a number,
11 but rather a formula; correct?

12 A That's right.

13 Q And would you -- strike that. Is it your
14 understanding that there are more than 5,000 cells in this
15 model that consist of some form of mathematical formula that
16 defines that cell?

17 A Yeah. I think -- I don't know the exact number. I
18 think it is between five and 6,000. There are a lot of them.

19 Q And has AT&T -- or Hatfield & Associates disclosed
20 and made publicly available all those 5,000 models or 5,000
21 formulas?

22 A To my knowledge they have. Again, if -- you know,
23 those may be situations where there is -- that's -- you may not
24 have the option as a reviewer of the model to change those
25 calculations. You have the option to see them.

1 Q Are you able to quantify what the rest of the data
2 is, or when you say "most of the data is data that cannot be
3 changed," are you able to put an order of magnitude on that?

4 A Well it's -- we're talking about 400 user
5 definables, which are the ones that should be user definable.
6 Those are the key assumptions to the model. They determine
7 whether it's right or wrong. Some of those change state by
8 state. Some don't.

9 To the extent that there are a million more cells
10 out there, five or 6,000 which are calculations, really
11 everything that's left over.

12 Q It's a mathematical difference of those numbers?

13 A I'm sorry? It's a very big number. It's hundreds
14 of thousands.

15 Q Who made the judgment as to which of the inputs
16 were ones that could be adjusted by the user and which ones
17 would be hard wired or in some manner made nonadjustable by the
18 user?

19 A I don't know what individual would have made that
20 decision. I have talked it over certainly with Dr. Mercer, and
21 it's my understanding the decision was made just on the type of
22 logic that I've described to you.

23 There is a lot of raw data here that's census data,
24 USGS data that shouldn't be changed by anyone reviewing the
25 model. That's not the data that's at dispute here.

1 is going to matter. Cost of capital is going to matter. The
2 variable overhead factor is going to matter; taxes, let's see,
3 network operations, NID, feeder fill, distribution fill,
4 distribution structure, distribution installation, copper
5 feeder structure, copper feeder installation, fiber feeder
6 structure, fiber feeder installation, drop NID internal
7 investment assumptions, structure factor shares related to
8 telephone, serving area interface investment, digital loop
9 carrier investment, and I believe that's all.

10 Now I -- what I -- let me be clear. What I'm
11 giving you here are the categories as I've written them down as
12 a guide to the document. There may be within each of those
13 categories I gave you a number of different specific inputs
14 that makes that list much longer. But that's the overview.

15 Q With respect to those inputs, how many of those
16 values have been drawn specifically from the Florida GTE
17 market?

18 A I -- well we will have to go back through.

19 Q Let me approach it this way. Can you identify any
20 of those inputs that contain values that were derived
21 specifically from the GTE Florida market?

22 A No. As I described to you before, these are --
23 national defaults were used unless there was a reason to change
24 them. And there weren't any reasons that were identified. Now
25 the loop costs are in fact Florida GTE specific for a number of

1 the -- how much is material and how much is labor, labor is
2 certainly a significant cost of -- a pole, for example. It
3 costs at least as much to put a pole in place as it costs you
4 to buy the pole in the first place.

5 But then when we start aggregating these costs
6 together and look at that total loop cost number, labor is a
7 much, much smaller component of that cost.

8 Q And the model assumes that the labor component cost
9 is the same in every state; correct? It just uses a national
10 number?

11 A It uses the national numbers which could be varied
12 if there were an instance where there were a reason to show
13 that labor costs in a certain region of the country were higher
14 than the national average.

15 Q And the same is true with respect to the material
16 or structural component; correct?

17 A That's right. The materials are -- I think the
18 material assumption is quite defensible, because most
19 companies, including GTE, have national purchasing operations.
20 You're going to buy lots of poles, and you're going to use the
21 fact that you're a national company to give yourself some
22 buying power when you do that.

23 Q All right. One of the other variables I think you

24 the other important one was depreciation?

1 not an opening of a trench and a closing of a trench. It's --
2 I don't know what the engineering term would be -- sticking it
3 down there directly comes to mind, but it's not necessarily a
4 trenching process. And I think this is actually much cheaper
5 than opening and closing a trench.

6 Q But the Hatfield documentation assumes that there is
7 going to be trenching costs of \$45 per foot; is that correct?

8 A That's right. And to the extent that there is a
9 cheaper way to do it, there is some overstatement of costs
10 here.

11 Q Now by using a structure factor .33 then, there's only
12 \$15 per foot for trenching attributed to telephone service; is
13 that correct?

14 A If I understand your question correctly, you're right.
15 Actually no one has asked it quite that way before. Let me
16 think about that for a minute. Yes, the answer is yes.

17 Q But the LEC presumably spent \$45 per foot for
18 trenching, so who's paying the other \$30?

19 A Well, actually, the middle assumption is the one that
20 may not be right and, that is, when you look at areas that are
21 being developed -- And I happen to be living in the middle of a
22 construction zone, so I'm seeing some of this stuff. You're
23 seeing trenches opened and three or four utilities actually
24 coming out and using that. And it's probably not even any of
25 the one of the three utilities that's digging the trench. What

1 I've seen are subcontractors digging a trench, utilities making
2 use of it jointly, they're coordinating their efforts as they
3 put their facilities in place to save money. And as the
4 incentive to save money increases, I think we'll see these guys
5 getting together more.

6 So, the answer to who else pays for it is whoever else
7 is putting facilities in that trench and at least in this case
8 it was cable and power.

9 Q So in your opinion would it be normal procedure for a
10 LEC to seek out other service providers to share the costs of
11 trenching before they install the buried cable?

12 A If it hasn't been standard procedure in the past in a
13 rate of return environment, and I can see where maybe it
14 wouldn't be, going forward, if they're right in what they tell
15 us about the new incentives of competition and the new
16 incentives of a price cap arrangement, then I think we have
17 every reason to expect it to become standard procedure. I
18 think they're going to find -- They're some very qualified
19 people running these companies; they'll find ways to save money
20 and this one appears to be a pretty obvious one that they can
21 make use of.

22 Q Do you know what percent of GTE Florida's conduits are
23 shared by other kinds of providers?

24 A No, I don't.

25 Q Do you know what percent of GTE Florida's telephone

1 poles are shared by other kinds of providers?

2 A No. And, again, we don't want to look at what's in
3 place today. We want to look at on a going-forward basis what
4 the number would be and what the sharing would be and if they
5 have got more incentive to share in the future, we're going to
6 see more of it, but certainly there is some today.

7 Q Mr. Wood, would you accept, subject to check, that
8 using the .33 factors reduced the total loop costs computed by
9 the Hatfield Model for GTE Florida by almost \$4 a month, \$3.90
10 to be exact?

11 A Again, I haven't run that analysis, but if Staff has
12 run it, I'll accept your figures. Again, I guess I'm glad to
13 see that Staff has made use of the model to run the sensitivity
14 analysis.

15 Q When a telephone company installs copper cable, is the
16 kind of cable that could be suspended on telephone poles
17 identical to the kind of cable that could be buried in the
18 ground?

19 A No, it will be a little bit different. Often the
20 suspended cable will have additional facilities that will
21 control the stretch. If you have ever looked at lines on a
22 pole in the summer, they sag quite a bit more than they do in
23 the winter. And, similarly, if you're going to bury cable
24 directly and not put it into a conduit, you're going to make
25 sure that there is a sheath that will protect from water entry.

1 So there is going to be some difference. There's not always a
2 big cost difference. It's a much bigger driver to go to, from
3 a, say a 20-pair cable to 3600-pair cable. That makes much
4 more difference than some of these other characteristics, but
5 there will be some different ones.

6 Q Is the price of cable that could be suspended on poles
7 identical to the price of cable that could be buried in the
8 ground?

9 A No, again, it won't be identical. It will be
10 different but it won't necessarily -- That won't necessarily be
11 the factor that drives the difference.

12 Q So does the Hatfield Model assume that the materials
13 price of aerial cable differs from that of underground cable?

14 A Well, it's got a different set of assumptions. And
15 let me get on the right page. The costs that you see there are
16 not always different, but they're changeable to reflect the
17 possibility.

18 Q I believe that's C-1.

19 A It's on C-1. I was actually also looking at the
20 document that has the column that describes the sources. But,
21 at any rate, you're going to see -- Where you see, you're going
22 to see two different columns here for Hatfield inputs, so that
23 it's clear that for different types of cables that will be used
24 in different ways like that, that the model will accommodate
25 differences in costs. To the extent that a significant

APPENDIX D

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF HAWAII

In the Matter of)	DOCKET NO. 96-0329
)	
AT&T COMMUNICATIONS COMPANY OF HAWAII, INC.)	PAGES 477-670
)	
)	(IN-CAMERA
Petition filed August 19, 1996 for)	PAGES 489-498,
arbitration with GTE Hawaiian Telephone)	611-613, 616-618;
Company Incorporated.)	SEPARATE BOOK)
)	
)	
)	
)	

TRANSCRIPT OF PROCEEDINGS

Held on October 17, 1996, commencing at 8:30 AM, at 465 South King Street, #103, Honolulu, Hawaii, pursuant to Notice.

BEFORE:

YUKIO NAITO
DENNIS YAMADA
GREGORY PAI

Chairman of the Commission
Commissioner
Commissioner

APPEARANCES:

MICHAEL H. LAU, ESQ.
MICHAEL P. HURST, ESQ.

For AT&T Communications of
Hawaii, Inc.

JEFFREY A. MALDONADO, ESQ.
J. BURKE MCCORMICK, ESQ.
ROD S. AOKI, ESQ.

For GTE Hawaiian Telephone
Company Incorporated

ALSO PRESENT:

BERTHA P. KUROAWA

Chief Clerk (PUC)

REPORTED BY: Sheila S.L. Chong, State of Hawaii C.S.R. No. 112

1 firm. And we believe that it comports to what a
2 telephone company do if it were building a network
3 today for the future.

4 Q. What real world data did you look at to
5 externally verify the model?

6 A. Well, the model contains numerous real world
7 input. It has, as I mentioned earlier, literally
8 hundreds of inputs. And these inputs are such things
9 as cost of equipment, cost of installation, expense
10 factors and so on.

11 Q. But did you ever run a test with it with any
12 state-specific real world data to see what the results
13 would be?

14 A. Not exactly, but let me try to do it this way.
15 I think it would be inappropriate to use
16 state-specific, certain state-specific real world
17 data. For example, as we all know, one of the
18 significant cost drivers in the model is fill factors.
19 If we were to use traditional telephone company fill
20 factors in our model, one would, one would get higher
21 prices. But I don't think it would be appropriate to
22 use those factors in the kind of forward-looking
23 economic cost model that we have built.

24 Q. So you haven't done any testing using
25 Hawaii-specific data of any of the variables in the

1 A. Well, my guess is it's larger than Rhode
2 Island, but relative to many states, it's a smaller
3 geographical area.

4 Q. But you'd agree there would not be a mountain
5 within a mile or two of the ocean in Rhode Island,
6 wouldn't you?

7 A. Well, they have some people in New Hampshire
8 who believe that they have mountains there --

9 Q. But that's not Rhode Island, is it?

10 A. But it's very close. But I agree with you.

11 Q. Now, a telephone customer may not necessarily
12 be connected -- and I'm talking about one in Hawaii
13 specifically -- may not necessarily be connected to the
14 nearest central office as the crow flies. Isn't that
15 right?

16 A. Yes, and that's probably true generally.

17 Q. Okay. Because there may be topographical
18 barriers that prevent running a loop from the
19 customer's premises to the central office. Isn't that
20 right?

21 A. That may be one reason.

22 Q. But the Hatfield Model, isn't it correct,
23 assumes that a customer will be connected to the
24 closest central office, doesn't it?

25 A. Yes, that's an assumption made by the model.

1 Q. Okay, and in that respect, the model does not
2 mirror a real world phenomenon.

3 A. That's right. Again, it is a model.

4 Q. What ratios have you assigned for GTE Hawaiian
5 Tel with respect to the amount of cable that's buried
6 underground versus aerial cable?

7 A. We use the default ratios in the model.

8 Q. What are the default ratios? Where did you
9 get the default ratios -- not what the actual numbers
10 are but where did you get them?

11 A. The engineers in the firm, Dick Chandler and
12 Bob Mercer, developed default measures based on talking
13 to experts and their experience in the industry.

14 Q. Okay. -

15 A. And I think they also looked at ARMIS data on
16 either a LEC or RBOC basis.

17 Q. So they didn't actually look at zoning
18 ordinances, for example, did they, that were say
19 Hawaii-specific?

20 A. No.

21 Q. And you said they talked to experts. Would
22 that be John Donovan?

23 A. That's one expert, yes.

24 Q. Did Mr. Donovan make any studies or did he
25 just base it on his experience with NYNEX?

1 A. Studies of what?

2 Q. Studies of where aerial cable would be
3 required versus cable buried underground?

4 A. Yeah. I can't give you a precise answer. I
5 don't know. I mean --

6 Q. You're not aware of any studies.

7 A. I'm not aware of any studies.

8 Q. Is it true that the data for cost of capital
9 that's used by the model was an estimate furnished to
10 you by AT&T?

11 A. No.

12 Q. Where did you get the data for cost of
13 capital?

14 A. The cost of capital data were contained in a
15 study that MCI submitted in a docket at the FCC.

16 Q. So it came from MCI.

17 A. Correct.

18 Q. Do you know whether the cost estimates for
19 things like manhole prices that are in the model for
20 Hawaii are in line with GTE's actual cost?

21 A. No, I don't.

22 Q. How does the Hatfield Model arrive at its fill
23 factors?

24 A. Those fill factors are based on the
25 engineering judgment of the engineers at Hatfield and

1 are formulas. We have no set of equations to represent
2 what's in those formulas; we don't have the code. It's
3 certainly true that as between this version, or this
4 release, and the earlier one, it is more
5 user-friendly. But there's a way in which it is not
6 user-friendly, when one is trying to do verification.
7 I've been doing some runs; we've engaged some people to
8 make some runs of the model for us; we're putting it
9 through the sensitivity testing that Dr. Kelley said is
10 one of the things that has to be done.

11 Now, we've been trying to do some of the
12 verification, and also some of what we would refer to
13 as validation -- and I'll explain what the difference
14 is. You run into some anomalies; you don't know
15 whether there's a bug in the code. This model has
16 undergone a lot of changes recently -- some minor and
17 some major. It is very likely there are still bugs in
18 the code. Are they important? Don't know. Do they
19 explain some of the anomalies? Don't know at this
20 point. How do you check that? Well, let me give you
21 an example.

22 Now, I was involved in an exercise in which we
23 increased the 3 switch input prices that are used in
24 the model by 33 percent to see what would happen.
25 Okay? Switching costs went up by what appears to be an

1 appropriate amount. We only increased the price of the
2 purchase of the switch, and that's not all the cost in
3 the wire center. Okay? But for some reason, loop
4 costs went down. Can't imagine why. Okay? Did we do
5 something wrong? We tried it a couple of different
6 ways. There is at least 2 different ways you can
7 enter inputs. We had different people run it on
8 different machines with different what are called "work
9 files," so that hopefully there was no contamination.
10 Okay?

11 We haven't resolved that thing yet. Now, how would
12 you do it? Well, one way to do it, if you had an
13 equation set, you'd check it. If you had the code,
14 you'd check it. - Absent that, what you have to do is
15 go in and try and find in Excel where those numbers are
16 used, everywhere they are used, and see how they're
17 working and what they are interacting with. There's
18 feature in Excel called -- and I'm not an Excel
19 expert -- it's called an "auditing" feature. It
20 identifies every place that the value that's in Cell
21 N30 is used. That's turned off in the Hatfield Model.
22 It may be for reasons of intellectual property
23 protection purposes -- and those may be legitimate. In
24 any case, it simply makes it much more difficult to
25 trace down things that you have questions about.

1 So the documentation that we have at this point is,
2 is not adequate. The sensitivity testing and the
3 verification and the validation have really just begun.
4 Now, in questions to Dr. Kelley there was some, there
5 was some discussion about what kind of validation --
6 that is, comparing the predictions. In an economic
7 model, the proof is in the predictions. So how good are
8 the predictions?

9 Well, you need to check what the model predicts,
10 not against embedded stuff but just recent or current
11 projects that have recently been finished - the
12 installation of a central office switch, the wiring of
13 a new development with 2 or 300 homes which
14 approximates the size of a census block group. Okay?
15 And I think both the model builders and users have some
16 responsibilities in that regard. It's not all the
17 responsibility of one party or the other.

18 There's one prediction, in particular, that I think
19 some of us are going to be interested to see what the
20 outcome is -- and that relates to a prediction, that
21 relates to the Hatfield Model's discussion of the
22 appropriate methodology or treatment for what it calls
23 these variable support costs.

24 What it says are incorrectly called overhead costs
25 because they seem to vary some with some measures of

1 the size of the firm, and so the argument is that if
2 instead of an integrated end-to-end local telephone
3 company, it was broken up into 11 separate entities
4 each producing an unbundled network element, okay, that
5 these variable support factors, or these overheads or
6 these common costs would be smaller for each one of
7 these firms -- and they use the example of the
8 president's desk. Presumably, that applies to the
9 president's salary and presumably it works as well for
10 the chairman's desk and the chairman's salary.

11 And we have a natural experience, experiment
12 happening. AT&T is about to trivest itself. And I
13 think several months down the road, we'll be able to
14 see whether the chairman's salary has gone down
15 substantially and whether his desk has gotten smaller.
16 And that ends my presentation. Thank you.

17 MR. McCORMICK: Thank you, Dr. Cole.

18

19

MICHAEL DOANE,

20 being first duly sworn on oath, testified as follows:

21

22 DIRECT EXAMINATION BY MR. McCORMICK:

23 MR. McCORMICK: Mr. Doane, you're still under oath.

24 Why don't you go ahead with your presentation.

25 A. Thank you. Good morning, Mr. Chairman,

APPENDIX E

1 SAN FRANCISCO, CALIFORNIA, SEPTEMBER 18, 1996 - 8:47 AM

2 * * * * *

3 ADMINISTRATIVE LAW JUDGE WEISSMAN: The Commission
4 will be in order.

5 This is the time and place for the first day
6 of arbitration hearings in Application 96-08-041.

7 There are several preliminary matters that we
8 need to address.

9 First of all, there were two pending motions
10 that I have discussed with the principal parties in
11 off-the-record discussions and wanted to memorialize
12 today.

13 The first was a motion by AT&T requesting that
14 our discussion of costs and prices related to various
15 services that would be part of the interconnection
16 agreement be limited to discussion of the proxies
17 offered in the FCC orders related to interconnection
18 agreements to the extent to which proxies exist for
19 those specific costs and prices.

20 And the implication of that ruling would be
21 that we would not directly in these hearings address
22 specific -- many of the specific cost studies offered by
23 GTE in its response to the petition for arbitration.

24 As I have indicated to the parties previously,
25 I will grant that motion.

26 The FCC orders are clear in terms of the fact
27 that in circumstances where the state has not already
28 adopted cost studies that are directly applicable to the

1 AFTERNOON SESSION - 1:25 P.M.

2 * * * * *

3 ALJ WEISSMAN: We'll be in order.

4 We're going to hear additional testimony in
5 Application 96-08-041.

6 Dr. Mercer who is the witness we're going to
7 hear today is currently still on in a proceeding next
8 door.

9 After we handle the one procedural matter,
10 we'll break until Dr. Mercer is ready.

11 The procedural matter concerns the status of
12 I believe five separate attachments.

13 I have five separate items that were part of
14 the work papers attached to the cost studies.

15 The most recent focus of our attention is a
16 letter that Ms. Lusing wrote to Randy Goch at AT&T and
17 faxed yesterday afternoon raising the fact that now
18 that the cost studies are being examined more closely,
19 and the issue of what to do with the vendor proprietary
20 cost studies comes back to the surface.

21 What I'd like to do in terms of trying to
22 understand this problem a little better -- Judge Kotz
23 also wants to have a dialogue among us about what these
24 studies are and the status of your efforts to get a
25 national agreement with the vendors.

26 If you could possibly first start by trying
27 to help us understand a little better what these are.

28 Do they, in fact, reflect cost studies

1 situation one could go about doing a test against
2 reality?

3 WITNESS DUNCAN: The test against reality may be
4 a difficult one.

5 My own view is that the company's models are
6 typically based on real data and I admit that my
7 understanding is -- companies don't share these, don't
8 put these out for other people to look at particularly
9 with oncoming competition.

10 I don't know the answer of how you would
11 check his model.

12 My claim is that it hasn't been checked. The
13 fact that it's difficult to do so or that it can't be
14 done, doesn't mean that that makes it necessarily an
15 acceptable model.

16 That's why I looked at these other areas.

17 ALJ WEISSMAN: Let's break away from the
18 discussion specifically of the Hatfield Model.

19 How would you, in a circumstances like this,
20 where you have to deal with whatever data you have
21 available, whether inside the company or outside the
22 company, develop a model and you using forward-looking
23 predictions about what costs are going to look like in
24 this particular industry with this particular set of
25 assumptions about future services, how do you do a
26 reality check of a model like that?

27 WITNESS DUNCAN: What I would do, I would
28 probably do some sampling. I would probably do a

1 study, maybe a third party study -- I'm not saying this
2 is feasible. I'm saying how would I go about doing it.

3 I would get into what the firm is currently
4 doing, look at what the firm is currently paying.

5 I do not believe that the firms are
6 inefficient in the sense in which they have been
7 characterized.

8 I actually think that the efficiencies are
9 not engineering efficiency. Any efficiencies are
10 pricing inefficiencies and that these will be rapidly
11 fixed by the market. The inefficiencies aren't
12 engineering inefficiencies.

13 As a consequence, you look at what is
14 actually happening now on a going forward basis.

15 My way of doing it, would be to estimate in
16 an econometric cost function based on input prices,
17 outputs, growth rates, blocking probabilities, grades
18 of service, whatever it is that needs to be in there
19 estimating an econometric model. And then go and ask
20 the question, "How will the input prices change.
21 How will those price blocking probabilities, grades of
22 service, fill factors -- How will those things change
23 cost of capital when there is competition?"

24 I don't believe the structure of a well
25 defined cost function is going to change.

26 If you estimated the cost function that
27 represents the technology, then it's a matter of
28 changing the inputs to match the inputs that you will

1 see in the competitive market.

2 To make it dynamic, it's a matter of doing a
3 little more present discounted value calculations,
4 taking into account the lives of equipment and into
5 account forecasts of demand.

6 I would hope -- I don't know this -- I would
7 hope there is sufficient data around for people to do
8 that. To go back a few years perhaps, build the model
9 based on a few years of data and forecast forward.

10 That would be the ideal.

11 It's at least conceptually possible.

12 WITNESS MERCER: I'm not sure how much discourse
13 is supposed to be. Can I just keep speaking to these
14 things?

15 ALJ WEISSMAN: I'll try to play traffic cop here.
16 You're on.

17 WITNESS MERCER: We just got a lot put on the
18 table. I thought you wanted me to go one area at a
19 time. You asked about reality.

20 ALJ WEISSMAN: Right.

21 WITNESS MERCER: You cannot use as a criteria
22 reality of what the future competitive situation will
23 look like because, if you look at GTE's network, it
24 would not reflect a competitive situation. It's not
25 competitive.

26 I want to get to this point about
27 competition, growth and so on later.

28 I want to stick right now to reality. And I

1 have another suggestion. The model will stand the
2 scrutiny of this, of how you check for reality today.

3 The way you check reality, you can look --
4 and you can look at and these cell -- these 5,000
5 formulas or read the documentation.

6 You can see what kind of traffic engineering
7 we assumed. You can see how we plan capacity. You can
8 ask yourself, "Is that the way the exchange carrier
9 would do it?"

10 Now, it's not true there has been no
11 comparison in real world studies.

12 There was earlier this year in a proceeding
13 on the universal service. There were specific areas
14 studied.

15 In those specific areas studied, the model
16 did some ups and some downs.

17 Here's the problem it disclosed about
18 reality. One point, Pacific Bell took a city which was
19 Angels Camp -- as I understand is a 300 household town
20 up in the hills -- and we looked at a specific feeder
21 route. The Hatfield Model looked at compared to what
22 we had done.

23 When we did that, we found the Hatfield Model
24 grossly underestimated the feeder plan. We went to
25 look and see what happened.

26 Here is what happened. We're talking about
27 serving a fraction of a 300 household town. In our
28 model -- assuming fiber deployment to digital loop